

### ABSTRACT OF THE DISCLOSURE

A detailed placement process which optimizes cell placement with up to one hundred percent densities in a linear run time. The output from a conjugate-gradient coarse placement process is input to the detailed placement process. A dynamic programming technique is used to optimize cell placement by swapping cells between two or more rows. The search space is pruned beforehand. A greedy cleanup phase using an incremental row placer is used. Thereby, the detailed placement process handles congestion driven placements characterized by non-uniform densities expeditiously and efficiently.